

CLAIMS

1. An emulsification method comprising flowing, conducting or circulating a pre-mix of two or more immiscible liquids through one or more magnetic fields under conditions to emulsify said pre-mix, wherein said pre-mix of two or more immiscible liquids is milk or comprises at least a hydrophilic liquid and at least a lipophilic liquid wherein said lipophilic liquid is selected from the group consisting of edible oils, fats, fatty acids and esters thereof formed from a saturated or unsaturated linear or branched aliphatic alcohol having from 1 to 18 carbon atoms or from a saturated or unsaturated linear or branched aliphatic polyol having from 2 to 6 carbon atoms or from a polyethyleneglycol or polypropyleneglycol or methoxy polyethyleneglycol having a molecular weight up to 1,500; natural or synthetic, saturated, mono-unsaturated or polyunsaturated acids having from 8 to 24 carbon atoms and optionally one or more functional groups such as hydroxy or epoxy; lipids including mono- and polyacylglycerols, phosphoglycerides, sphingolipids, amino-amidines, and mixtures thereof.
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2. An emulsification method according to claim 1, wherein said hydrophilic liquid is an aqueous or nearly-aqueous phase.
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3. An emulsification method according to claim 1 or claim 2, wherein said pre-mix further comprises one or more viscosity regulators and / or one or more emulsifiers or emulsion stabilizers or surfactants.
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4. An emulsification method according to any of claim 1 to 3, wherein said method is carried out continuously or intermittently.
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5. An emulsification method according to any of claims 1 to 4, wherein said pre-mix further comprises solid particles suspended therein.
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6. An emulsification method according to any of claims 1 to 5, wherein the strength of each said magnetic field is at least about 2,000 gauss.
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7. An emulsification method according to claim 2, wherein the proportion of said lipophilic liquid in said pre-mix is within a range from 3 to 60% by weight.
8. An emulsification method according to any of claims 1 to 7, wherein said pre-mix of two or more immiscible liquids is re-circulated from 10 to 10,000 times through each said magnetic field.
9. An emulsification method according to any of claims 1 to 8, wherein the linear flow rate of said liquids through each said magnetic field is between 0.25 and 25 m/s.
10. A method according to any of claims 1 to 9, wherein the residence time of said fluid through each said magnetic field is between 60 microseconds and 10 seconds.
11. An emulsification method according to any of claims 1 to 10, wherein flowing said liquids through said magnetic field(s) is effected at a temperature between 10°C and 90°C.
12. An emulsification system consisting of:
 - means for generating one or more magnetic fields, said means being mounted in a circuit or loop comprising at least a liquid containing portion filled with two or more originally immiscible liquids, and
 - means whereby said two or more liquids contained in the liquid containing portion can be conducted or circulated through said one or more magnetic fields.
13. An emulsification system according to claim 12, wherein said means for generating one or more magnetic fields are mounted in the circuit or loop downstream of the liquid containing portion and upstream of the means whereby the two or more liquids contained in the liquid containing portion can be conducted or circulated through said one or more magnetic fields.

14. An emulsification system according to claim 12, wherein the circuit or loop includes one or more tubings, channels or ducts wherein said two or more liquids can flow from and back to the liquid containing portion, and the means for circulating said two or more liquids through the magnetic field(s) includes one or more pumps mounted in the said circuit or loop.

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15. An emulsification system according to claim 12, wherein the said pump(s) are designed such as to allow for controlling or regulating, e.g. keeping constant or else varying according to a predetermined scheme, the speed at which the two or more liquids are conducted or circulated through the magnetic field(s).

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16. An industrial process including an emulsification method according to any of claims 1 to 10 as a process step.

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17. An industrial process according to claim 16, wherein said process further comprises one or more post-processing steps performed following the emulsification step.

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18. An industrial process according to claim 17, wherein said post-processing step is a heating step.

19. An industrial process according to claim 17, wherein said post-processing step is a cooling step.

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20. An industrial process according to claim 17, wherein said post-processing step is a drying step for at least partially removing the hydrophilic liquid present in the emulsification step.

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21. An industrial process according to claim 17, wherein said post-processing step is a freeze-drying step.

22. An industrial process according to claim 17, wherein said post-processing step is a step of diluting the emulsion through the addition of a liquid into said emulsion.

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23. An industrial process according to any of claims 16 to 22, wherein said process further comprises one or more steps of controlling the size of droplets or micelles produced during the emulsification step.

10 24. An industrial process according to claim 23, wherein said size controlling step is performed by dynamic light scattering analysis.

25. An industrial process according to claim 24, wherein said process comprises a post-processing step performed following the emulsification step and further comprising one or more steps of controlling the size of emulsion droplets or micelles during or after said post-processing step.

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26. An industrial process according to claim 25, wherein said size controlling step after said post-processing step is performed by dynamic light scattering analysis.

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27. An industrial process according to any of claims 23 to 26, wherein said size controlling step is performed in such a way as to measure the average size and/or the size distribution.

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28. An industrial process according to claim 17, wherein said post-processing step is a sonication step.

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29. An emulsification method according to any of claims 1 to 11, wherein said pre-mix of two or more immiscible liquids is milk, whereby the average size of the smallest micelles or particles contained in milk is decreased by at least 50%.

30. A product having improved storage stability, being selected from the group consisting of detergents, cleaning products, lubricants, cosmetic, veterinary and pharmaceutical compositions and food products, said product including an emulsion prepared by a method according to any of claims 1 to 11.

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